

PATENT SPECIFICATION

(11) 1 240 969

1240969

DRAWINGS ATTACHED

- (21) Application No. 30238/70 (22) Filed 22 June 1970
(31) Convention Application No. 4050 (32) Filed 25 July 1969 in
(33) Denmark (DK)
(45) Complete Specification published 28 July 1971
(51) International Classification G 09 b 27/08
(52) Index at acceptance G5G 1
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(54) IMPROVEMENTS IN AND RELATING TO GLOBES

(71) We, SCAN-GLOBE A/S, a company incorporated under the laws of Denmark, of Vodroffsvej 26, 1900 Copenhagen V, Denmark, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to globes, including terrestrial globes and globes showing the surface of the moon or other celestial bodies or the stars on the sky or firmament.

Up to now, globes have been manufactured according to two different methods. In one method, the map image is printed on to a number of oblong segments, each corresponding to a fraction, for instance, one twelfth of the spherical surface. These segments or strips are thereupon pasted successively side by side on to a rigid supporting sphere which may be opaque, e.g. made of cardboard, or transparent, in case a light source is to be fitted inside the globe. In the other known method, the map image of each of the two hemispheres is printed on its own sheet, whereby the two sheets may be printed in one operation and separated afterwards. Each printed sheet is subsequently laminated with one or more additional sheets in order to obtain a suitable thickness and the laminated sheets are, e.g. by vacuum moulding, shaped into two hemispheres which are thereupon glued together.

While the first method is very time consuming due to the work involved in mounting the many segments, the other method is considerably faster, but has, on the other hand, the disadvantage that during the moulding of the relatively heavy sheet material, local irregularities in the plastic deformation of the material may easily arise, which leads to distortions of the final map image on the globe surface so that the quality of the vacuum-moulded globes often is unsatisfactory.

According to the invention there is provided a globe comprising a central support-

ing sphere and at least one outer shell composed of two hemispherical shell parts detachably connected to one another and to the supporting sphere, wherein the supporting sphere is neutral, i.e. without any map image printed thereon, whereas the globe image is provided on the outer shell parts which are made from a thin sheet material and shaped by deep drawing, such as vacuum moulding.

A globe according to the invention can be produced with a high degree of accuracy or precision, since the moulding process of the comparatively thin sheet on which the map image is printed, involves only a small danger of distorting the image, and also at a low cost since the laborious job of aligning or positioning the several map segments in the first-mentioned method is avoided. Since the deep drawn shell parts are not fixed to the supporting sphere, they can easily be replaced so that the same neutral supporting sphere may be used to show for instance the earth, the moon, other planets or celestial bodies, or the firmament. This results in a substantial saving as well as in a reduced space requirement for storing the globes.

According to a preferred embodiment of the invention, a plurality of transparent outer shells showing different map images may be arranged to be mounted in nested relationship on the supporting sphere. By way of example, it will be possible in this way to produce a terrestrial globe with inner shells bearing a political and/or physical map image and one or more outer shells showing e.g. climatic zones, flora and fauna regions, time zones, the distribution of different religions and other interesting items of information for supplementing the innermost image. This possibility is of particular importance for the use of the globes for instructional purposes.

In the following, the invention will be described in greater detail by way of an embodiment thereof.

A supporting sphere is produced, in a

[Price 25p]

similar manner as the known globes, of a suitable rigid material, either opaque, as e.g. cardboard, or transparent for a so-called illuminated globe. The transparent sphere may
 5 be made of glass or, by moulding or blowing a parison of a suitable rigid plastic material, e.g. polystyrene. The sphere may, in a known manner, at its poles, be provided with holes for mounting carrying pins, around which the
 10 sphere is able to rotate. By means of the pins, the sphere is supported on a holder which may be designed as a meridian scale and secured to a base or foot in such a way that the inclination of the axis of the sphere corresponds
 15 to inclination of the terrestrial axis relative to the ecliptic. If the sphere is transparent, one carrying pin may, in a known manner, be fitted with a socket for an internal lamp, the electrical supply lines of which are led through the hollow pin.

The desired map image is printed in two halves on flat, thin sheets of deformable material, a thermoplastic material for example, whereupon each half of the image is formed
 25 to a hemispherical shell by vacuum moulding or other deep drawing by means of a suitable tool. It will be understood that the printing plates or printing cylinders used will have to be designed with due regard to the deformation
 30 to which the map image is subjected during the moulding process. It is expedient to provide a hole in the centre of each half image, corresponding to the above-mentioned carrying pins for the supporting sphere.

Subsequent to moulding the two shells and trimming them by removing the marginal flanges of the sheet by means of which they were held during the moulding process, the two hemispherical shells may now be mounted
 40 on the outside of the neutral supporting sphere, the above-mentioned holes in the shells serving to locate them in relation to the axis of the sphere. It will normally be possible to undertake the complete aligning or positioning of the shells relative to each other without any
 45 difficulty on the basis of the longitudinal meridians forming part of the printed image on the sheets. The shells may additionally be provided with special markings to indicate their correct placing relative to each other.

After mounting the two hemispherical shells on the sphere and securing them provisionally by means of the carrying pins in the poles of the globe, the shells may be temporarily fixed
 55 to each other by means of a strip of adhesive tape laid around the equatorial dividing line. It will be understood that it will be advisable to use an adhesive strip which may be removed again without thereby damaging the sheets and the map image thereon. In this
 60 manner, it will be possible to alternately mount externally on the same supporting sphere different shells, be they transparent or opaque, and bearing images of, for example,
 65 the earth, the firmament, the moon, etc. It

will also be possible, by means of interchangeable shells, to alternately illustrate different aspects of the earth, e.g. aspects of a geographical, political or climatical nature, etc. As it is possible to make the shells of rather thin
 70 sheet material, it will be possible to place two or more such shells in nested relationship so that it will be possible to simultaneously illustrate several of the aspects mentioned, which can be of great value for, inter alia,
 75 educational purposes. By way of example, it will be possible to elucidate in this manner the relationship between features of the landscape, climate, population density, technical development, etc.

By making the shell parts of transparent sheet material it will be possible to print on both sides of the sheet. It will, for instance, be possible to have a physical map image
 85 printed on the outside of the sheet and a political map image on the inside. When the transparent sheet shells are mounted on a transparent sphere provided with internal illumination, the physical map image will be visible when the internal illumination is switched off,
 90 while the political boundaries will also appear when the internal illumination is switched on. It is obvious that it will be possible, instead of political boundaries, to print climatical and pluvial zones or plant regions, time zones,
 95 etc. on the inside of the sheet, which will then appear on the globe in a corresponding manner by means of transillumination.

In the accompanying drawings

Fig. 1 shows a side elevation, partly in section, of a globe embodying the invention, 100

Fig. 2 shows a section, on a larger scale, of the globe shown in Fig. 1,

Fig. 3 is a view corresponding to Fig. 1 of a terrestrial globe mounted in a different
 105 holder, and

Fig. 4 is a section, similar to Fig. 2, showing a modification of the means for detachably holding two hemispherical shells together on the supporting sphere. 110

The globe shown in Figs. 1—2 comprises a transparent hollow sphere 1, which may be made of glass or of a transparent rigid plastic material. The sphere is provided with apertures in two places located opposite each other,
 115 which serve to support the sphere for rotation on two carrying pins 2 and 3. The pins 2 and 3 are detachably secured to a holder 4 which in Fig. 1 is shown in the form of a semi-circular rail and which may be provided with a meridian scale, not shown. The holder 4 is, in turn, secured to a foot 5 in such a way that the axis of the sphere 1 formed by the common axis of the pins 2 and 3, is inclined with respect to the vertical. The lower pin 3
 125 is hollow and has, in its end extending into the sphere 1, a fitting for a lamp 6, by means of which it is possible to illuminate the sphere from the inside. The associated supply line 7 is led out from the sphere via the hollow pin. 130

The map image shown by the globe, in the embodiment shown an image of the earth, is printed on two transparent, hemispherical shells 8 and 9, of which the shell 8 shows the Northern Hemisphere and the shell 9 the Southern Hemisphere. As described above, the shells 8, 9 are made of transparent sheet material, in which process each sheet is first printed with the respective part image and subsequently, by means of vacuum moulding, formed into a hemisphere. Each sheet is, in the centre of the map image corresponding to the associated pole, provided with a circular aperture, the diameter of which corresponds to the diameter of the associated carrying pin 2 or 3, respectively.

The formed hemispherical shells 8 and 9 may be placed on the neutral sphere 1 and centered by means of the pins 2 and 3. After having been placed on the sphere, they may be connected to each other as shown in Fig. 2 with the aid of an adhesive strip 10 extending across the junction at the equatorial line 11. In this operation, the two shells are positioned beforehand in such a way that the meridians printed on them are in alignment, as appears from Fig. 1.

In a modified embodiment, not shown, the two hemispherical shells can be printed in such a way that they do not meet in the equatorial line, but along a meridian. The placing of the shells on to the sphere and their removal therefrom is somewhat simplified hereby, since it is not necessary to remove the carrying pins. The centering of the shells on the pins, in this case, is effected by means of semicircular recesses or apertures provided in pairs in the said meridian, which constitutes the edge line of the part image in question. Accordingly, in the place of the circumferential adhesive strip shown, use is made of two strips each extending across approximately 180° of the meridian.

Figs. 3 and 4 show a terrestrial globe having an inner supporting sphere 12 which may be made of opaque material such as cardboard since no internal illumination is provided therein. The globe or map image is printed on the hemispherical shells 13 and 14 corresponding to the shell parts 8 and 9 of Figs. 1 and 2. The assembled globe is supported freely in a base 15 consisting substantially of three angularly equispaced legs 16 joined together along a vertical centre line and further connected at their upper edges by means of a ring 17 located substantially at the equator height of the globe. It will be appreciated, that the globe may be supported in the base or holder 15 with its pole axis inclined as shown or in any other orientation, e.g. vertical, if the image shown by the detachable shell parts is a picture of the moon surface.

The shells 13 and 14 differ from the shells 8 and 9 of Figs. 1—2 in that there are no apertures at their poles and furthermore they

are not contiguous but slightly spaced at the equator line as appears from Fig. 4. The connection between the shell parts is effected by means of a resilient ring or strap 18, which normally has an inner diameter less than the diameter of the shell parts. Consequently the ring 18, when slipped over the assembled shell parts will be elongated and consequently press the shell parts towards the supporting sphere 12 and hold them together with frictional forces determined by the elastic tension due to the elongation of the ring. As shown the ring 18 has an outer part extending in engagement with the edge zones of both shell parts 13, 14 and a central part projecting inwardly against the surface of sphere 12 between the opposed and spaced edges of the shell parts, whereby the positioning of the ring relative to the shell parts is greatly facilitated.

It will be appreciated that elastic shell connecting means as shown in Fig. 4 may also be utilized with globes which, as shown in Fig. 1, are mounted in a holder having locating pins which determine a fixed position of the pole axis, and similarly globes as shown in Figs. 3—4 without locating pins and holes in the sphere and shells may be used with an adhesive tape as shown in Fig. 2 for connecting together the hemispherical shells.

WHAT WE CLAIM IS:—

1. A globe comprising a central supporting sphere and at least one outer shell composed of two hemispherical shell parts detachably connected to one another and to the supporting sphere, wherein the supporting sphere is neutral, i.e. without any map image printed thereon, whereas the globe image is provided on the outer shell parts which are made of a thin sheet material and shaped by deep drawing, such as vacuum moulding.

2. A globe as claimed in claim 1, wherein the supporting sphere and the outer shell parts are transparent.

3. A globe as claimed in claim 1 or 2, comprising a plurality of transparent sheet shells bearing different map images and arranged to be mounted in nested relationship on the supporting sphere.

4. A globe as claimed in any one of claims 1—3, comprising means for correctly locating each shell part relative to the supporting sphere.

5. A globe as claimed in claim 4, wherein the locating means comprise a centering aperture at each pole.

6. A globe as claimed in any one of claims 1—5, wherein the means for connecting together the shell parts comprises an adhesive tape.

7. A globe as claimed in any one of claims 1—5, wherein the means for connecting together the shell parts comprises an elastic ring having an inner diameter less than the shell diameter.

8. A globe, substantially as described herein-
before with reference to and shown in the
accompanying drawings.

REDDIE & GROSE,
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6 Bream's Buildings,
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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1971.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from
which copies may be obtained.



